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The Malaysian digital cadastral database

Submitted by the Federation of Land Surveying and Geomatics of the Association of South-East Asian Nations**

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THE MALAYSIAN DIGITAL CADASTRE DATABASE

Issues and Strategies

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One of the oldest govt depts in Malaysia (c. 1885)

Modernisation Strategy: (wef 1986)

~ use of total stations + data loggers in field

~ computerise data processing in office

~ role of the private sector

~ revise SOP / Land Surveyors Act / Survey Regulations, etc

~ consultancy with consortium of international experts

ECONEXPERT

SPDK / Cadastral Database Management System

~ implemented wef 1999 to date

Problem statement

≈ 6 Million parcels

≈ 3.5 Million Qualified Titles

≈ 500,000 Certified Plans

≈10 Million records

=> of various scales, accuracies & epoch

Problem statement

- 12 regional offices
- Cassini Soldner, each with own origin
- Geodetic network }
- GPS network }

Rectified Skew Orthomorphic Projection nationwide

ECONF9188C7

The CDMS Project

- Implemented in 12 States
  - » *At Headquarters & district levels*
- Pilot at KL & Selangor offices
- RM 50 Million budget
- Final acceptance January 2000
  - *– 12 months implementation period*

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The Project Components

- Quality Assurance System
- Digital Imaging Management System
- Improved Counter Service
- Remote & Internet access ~ e-commerce
- Outsource to the private sector

Components of CDMS

- Hardware
  - ❖ Database/Web Server , Interactive Graphic Workstation, Desktop PC, Plotter, Printer, Scanner, Storage Media (SCSI Disk, Disk Array, CD Writer) and Networking & Internet Access

- Software
  - ❖ Open System, Networking Software, Application Software for DIMS, Counter Service Software, Microsoft OA Software for PC, Application Software for QAS, CPS software, GIS software/RDBMS* Software and Web Software

** ArcInfo, ArcView,MapObjects, ArcSDE*

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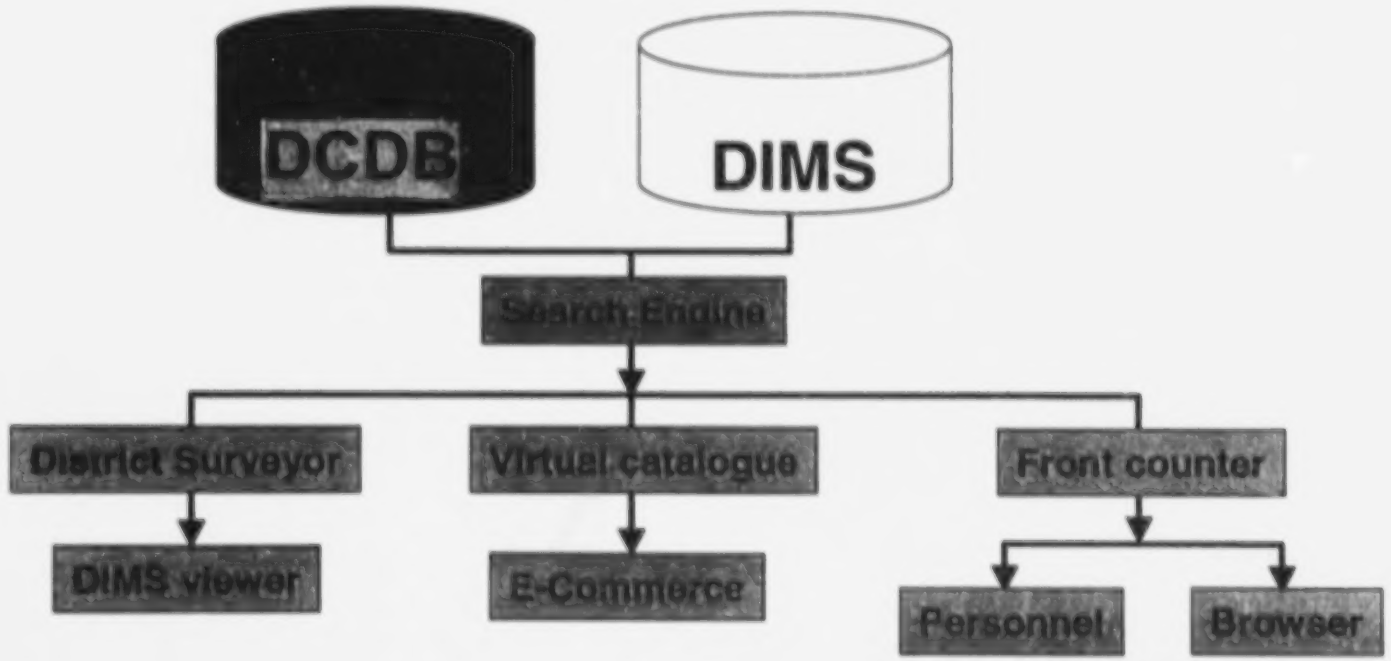

Range of products
- Maps
- Certified plans
- Standard sheets
- Lot information
- Search
- Technical information
- User-defined

Format
- Hardcopy
  - A4 – A0
- Softcopy
  - Tiff
  - DXF
  - Shapefiles

Media
- Paper
- 3.5" floppy
- 5.23" CDRW

Delivery
- Download, ftp
- Postal, courier

Databases being created in the Dept:

1. Digital Cadastral Data Base (DCDB):

~ at the State level (12 states)

2. CAMS data base (Digital Topographic Data Base) :

~ at the national level

ACCURACY OF SPATIAL DATA BASES

- DATA QUALITY

  - " fitness for use ": reliable, accurate, current, relevant, complete, timeliness, precise....
  - conveniently handled, adequately protected, metadata

  α *Accuracy, Precision, Error*

ACCURACY:

~ level of accuracy α objectives of application

PRECISION:

~ hardware dependent

α scale, unit of measurement, objectives of application

ERROR:

~ gross, systematic or random errors

UNCERTAINTY:

~ " lack of total confidence in use of the data ": incomplete knowledge of data

SOURCES OF ERRORS (in geographic data) :

- INHERENT ERRORS:

~ occur naturally in geographic data no matter what instruments or procedures used for data acquisition, management & application

- OPERATIONAL ERRORS:

~ " processing errors " α imperfections in instruments and methods used for data acquisition, management & application

Errors occur all the time & may be carried over to subsequent stages of processing !

COMPONENTS OF GEOGRAPHIC DATA QUALITY *

1. Lineage

2. Positional accuracy

3. Attribute accuracy

4. Logical consistency

5. Completeness

6.Temporal accuracy

7. Semantic accuracy

*** US National Committee for Digital Cartographic Data Standards , International Cartographic Association.**

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ASSESSMENT OF DATA QUALITY

1. EVALUATION OF POSITIONAL ACCURACY

   Planimetric accuracy

   Height accuracy

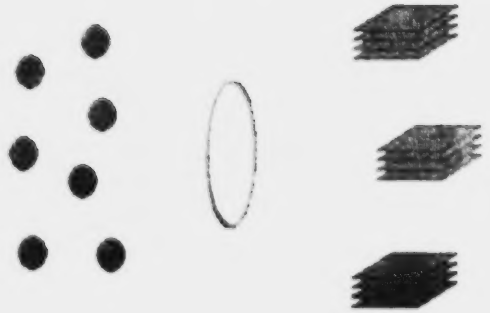
2. EVALUATION OF ATTRIBUTE ACCURACY

   Compare sample data with reference data via field verification, sources of data of higher accuracy

Data Catalogue

Data Portal

- Know where you have data
- Know what data you have
- Get access to you data
- Make your data work



"Fitness for Use"

- Digital data can be wrong!
- Database is only as good as the lowest quality data layer.
- Mistakes can have deadly consequences.
- Data rules and education of the users is crucial.

SPATIAL DATA INTEGRATION ISSUES

DCDB: high internal & relative acuracy

1:80K 1st Class, 1:40K 2nd Class svys

VB interface: GEN + ArcView shape files

CAMS: mapping data, multiple layers

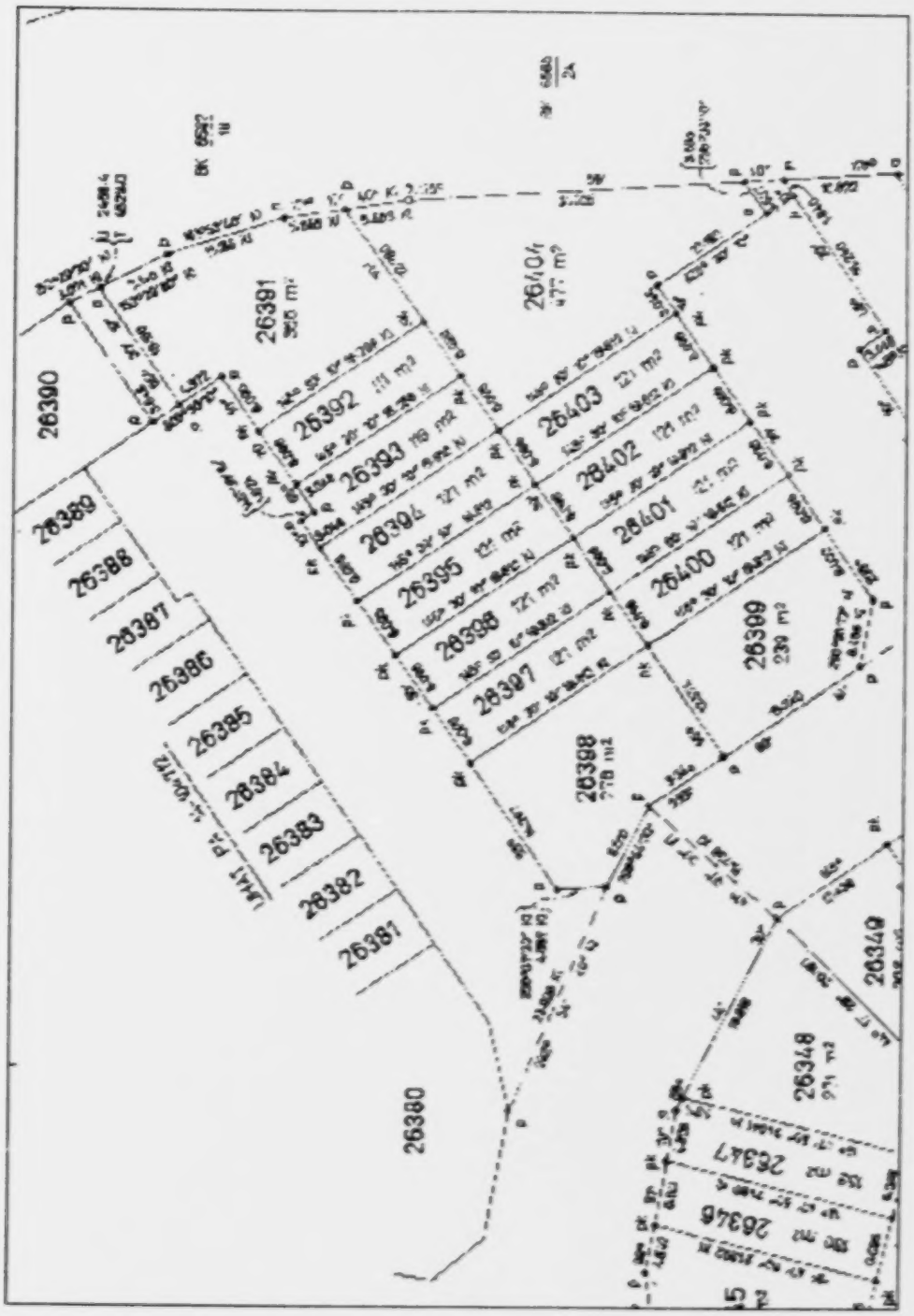
1:40K → 1: 5K

lower internal acc.

good absolute acc.

CAD - not GIS ready

SPATIAL DATA INTEGRATION ISSUES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SAMPLE OF CAMS DATA

- Prepared in CAMS format
- Data in Layer form
- Map Scale 1:25,000

Spatial Data Integration Issues..

- Referencing:
  - Cadastre : Cassini
  - CAMS : RSO (Oblique Mercator)
  - CCS : geocentric, WGS 84 ~ ITRF + velocities

- CAMS: not comparable with DCDB map scales, geometric acc, data acquisition strategy, etc

Strategies & future direction…

- Strategy for integration:
  - Fully GIS ready db within a small test area
  - CAMS map with DCDB map overlay
  - Appropriate scale for integration
  - New product (orthophoto imageries) line for CAMS?

Strategies & future directions…

- The SPDK / CDMS project:

  Towards a Cadastral Vision

- National Cadastral Data Infrastructure:

  -a cadastral toolkit at the state level

  - ability to integrate with other databases

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Strategies and future directions…

- Institutional arrangements:

  Political acceptance

  Stakeholders:common vision

  Common infrastructure

- Sustainability:

  RM50 Million + RM 80 M allocation 8MDP (2001-6)

  Geo-processing staff: in-house + outsource

Strategies and future directions....

- database development

  Integrated, holistic approach : in-house + outsourcing strategy

  LONG TERM VISION

- manpower related issues:

  In house core group

  User / developer close interaction + learning

National & International recognition...

- Finalist in Prime Minister's Quality Award
- Winner of PIKOM Malaysia's Innovation award (1999)
- ESRI Special Achievement in GIS (SAG) Award July 2000